

HYPODERMIC NEEDLE HOLDER

This application is a continuation-in-part of copending
U.S. Patent Application No. 09/665,636 filed September 19,
2000.

Field of the Invention

The present invention relates to hypodermic needle
holders, suture needle disposal and disposal structures, and
more specifically to a hypodermic needle holder and disposal
structure that minimizes the risk of inadvertent needle sticks
that may result from coupling or uncoupling a hypodermic needle
from a hypodermic syringe or recapping a hypodermic needle, or
may result from improper storage of a hypodermic needle while
the needle is temporarily not in use.

Background of the Invention

Use and handling of hypodermic needles is a frequent
occurrence in the field of medicine. Hypodermic needle systems
typically consist of a hypodermic syringe that is quickly and
easily removably attachable to a variety of hypodermic needle
types and sizes by frictional engagement or by screw-on
engagement, the latter of which is usually achieved using a
LUERLOCK system. Handling and use of hypodermic needles
inherently includes a certain amount of risk of accidental
needle stick either to the person who may be administering an

injection or to others in the immediate vicinity if a used hypodermic needle is improperly stored or carelessly placed prior to disposal.

Recapping a hypodermic needle after an injection is a likely cause of a large percentage of the composite risk factor for needle sticks in health care settings; most institutions discourage recapping of hypodermic needles under any circumstances. In some states and counties, safety laws prohibit recapping and other unsafe disposal practices.

Unfortunately, this may also mean that the person responsible for disposing of a used hypodermic needle and syringe may have to travel more than a short distance to reach a sharps disposal container, thereby exposing more people than necessary to the potential hazard of incurring a needle stick and increasing their own risk for injury en route.

In some procedures, and for a given patient, there arises the need to re-use a needle during the procedure. For dentists who apply numbing medication in the oral cavity, repeated applications may be required with corresponding re-use of the needle. In other re-anesthetizing uses, such as during suturing, a needle may be re-used. For example, where the tissue requires further, later in time handling of the syringe and needle to either continue anesthization or to move on to another area on the patient's body. In these and many other re-use scenarios, there is simply no proper procedure for

interim protection of personnel, isolation of the used and to be used again needle. In some hospitals it is required that a drape cover the sterile field when significant time elapses between a procedure and the next procedure, or where when significant time elapses between a series of procedures. The use of a drape can pick up contamination and spread it with subsequent manipulation of the drape. The drape may catch on the needle or other objects in the sterile field and produce a stick through the drape or even catch the needle and cause it to drop to the floor when the drape is removed. Although the use of the drape to block dust and airborne contaminants, the increased risk of sticks, cuts and upset spills of the materials in the field increase several fold when the drape covers the objects in the field, and there is further increase of accident each time the drape is handled after its initial deployment.

Even systems which are touted to be "needle-less" continue to create a danger of needle stick. One recent system includes a seventeen gauge tube with a generally blunt (transverse even tubular end) end which is supposed to be protected by a sleeve. If anything, this system is just as apt to create accidental stick contamination as the needle end is hidden until it makes contact with the skin, and the temporary hiding of the needle in the sleeve causes unwarranted reliance on the sleeve with increased carelessness.

Further, in health care settings, certain intravenous medications are required to be given in incremented doses and are repeated until a desired effect is achieved. When this is the case, it is not uncommon to repeatedly fill the same hypodermic syringe with medication and to perform repeated intravenous injections into a port that leads directly to a vein or leads into an intravenous fluid line that terminates in a vein. This is usually the case, for example, with patients who have problems of an emergent nature, such as cardiac or respiratory arrest, or problems of an urgent nature such as heart failure or respiratory difficulty, or even for patients undergoing surgery. Because large volumes of fluid may be drawn up into a hypodermic syringe in anticipation of needing them, they are often drawn up using a large gauge hypodermic needle, such as an 18 or even a 16 gauge hypodermic needle for speed and convenience, and this may include the above "needleless" system. Injecting an intravenous port with such a large gauge hypodermic needle even once could damage the membrane of the port, causing leakage at the port, and thus rendering the entire intravenous tubing useless such that it would have to be replaced. For this reason, administration of intravenous medications typically takes place using a smaller gauge hypodermic needle, usually less than a 20 gauge. This may require that the large gauge needle and the small gauge needle be intermittently exchanged for one another, and certainly

requires that whichever needle is not in use be kept from contamination. In dire circumstances, where the patient's condition may be serious and where the environment is likely to be somewhat chaotic as a result, the chances of improper placement of a used hypodermic needle increases significantly. Subsequently, the risk of hypodermic needle contamination increases, as does the risk for inadvertent needle stick for personnel who are caring for the patient, and even for family members or others who may be present.

In caring for a patient who receives frequent injections of any kind at the bedside, health care personnel may have their attention diverted from the task at hand by some distraction, and may subsequently place a used hypodermic needle on a bedside table or even on the bed beside the patient in order to address the distraction. Not only could this practice cause unintentional injury to the patient, but health care personnel and others who may have occasion to enter a patient's room after the fact are also at risk of being stuck or otherwise injured by the stray hypodermic needle.

Yet another potentially harmful procedure is that of drawing up medications from a vial that requires puncture of a membrane in order to access the medication within the vial. Although the hypodermic needle is not biologically contaminated, this practice still presents the potential for injury to the health care worker or others, since it requires

recapping the hypodermic needle until the medication is to be administered. Similarly, medications contained in scored glass vials that require breakage of the vial and drawing up of the medication through a hypodermic needle is another practice that increases risk of needle stick, primarily because of the need for recapping the hypodermic needle prior to giving the injection.

A carelessly placed hypodermic needle that causes injury may result in temporary incapacitation of the health care team member who sustains the injury. Prompt treatment of the injury is encouraged by most institutions, and incident reports are mandatory, thereby potentially compromising patient well-being by decreasing the number of staff available for immediate patient care.

Yet another potentially injurious situation is that involving hypodermic needle disposal. Disposing of an uncapped hypodermic needle, even into a designated sharps container, can be a dangerous act in itself. Because of the design of most sharps containers, if the container is nearly full, it can prove to be difficult if not impossible to safely insert an exposed hypodermic needle into the box without injury either from the hypodermic needle being inserted or from other needles that may have become lodged in the opening of the box.

While hypodermic needles and syringes are likely the cause of most needle stick injuries, surgical needles and other small

sharps containers commonly used in a health care setting are also potential hazards if not disposed of properly. Because suture needles are quite small, simple suturing at a patient's bedside may result in misplacement of the small suture needle and attached thread should it not be immediately disposed of or placed in a safe location prior to its disposal. A stray needle in the patient's bed or on the floor could result in patient injury or injury to health care workers, patient family, or others who may come in contact with the patient or who may have occasion to be in the patient's room. Lack of an appropriate disposal container in an operating room could also lead to misplacement of suture needles during a patient's surgery; this could be particularly problematic, and could place the patient in unnecessary danger by delaying the completion of the surgery until all suture needles are located.

Other persons at risk for injury from needle stick include family members or unskilled lay persons who may help to care for patients in a home setting and who may regularly assist, for example, with subcutaneous administration of medications such as insulin. Other persons at risk include paramedics and emergency health workers who are always on the move, continually working in harried, difficult conditions and have no prepared surgical field to use as a base of operations. With paramedics, for example, time is of the essence. If too much time is required in either disposing of or temporarily

storing a needle, the parametic may toss it on the ground where it may contaminate others or toss it in the medical kit.

Without a proper, inviting and very available place to both store needles during extended procedures and to at least safely and temporarily dispose of needles on the move, needle sticks and the like will remain a major problem to emergency health professionals.

Yet another situation where accidental needle sticks or other injury can occur is after an intravenous line is initiated on a patient. Because the intravenous catheters used are catheter-over-the needle systems, once the catheter is in place, the needle is extracted and disposed of. Whether the intravenous line is started in an emergency situation that may be chaotic, or whether started in the most optimal of situations, the needle may be improperly placed on whatever surface is nearest at hand so that the catheter may be secured and fluids or medication may be administered. Should the needle be forgotten once the procedure is complete, it will pose a risk for those in the immediate vicinity. Some new catheter systems include safety devices, but use of such devices still involves the needle being left out with continued danger of needle sticks at the point.

Although most, if not all, health care institutions have designated procedures for the proper use and disposal of needles, and although most institutions additionally require

health care workers to attend continuing education classes for learning safe handling and disposal of sharps and other biologically contaminated equipment, accidental needle sticks continue to occur and are an ongoing problem. The risk of accidental needle stick is cause for serious concern, both to health care workers and to others who may be exposed to the use of hypodermic syringes and needles of any kind, due to the existence and transmissibility of life threatening blood-borne diseases such as hepatitis, and Acquired Immune Deficiency Syndrome (AIDS).

What is therefore needed is a device and method that is easy and convenient to use and that will minimize the risk associated with handling and disposal of hypodermic needles and hypodermic syringes. The proposed device should be useable by trained health care personnel,, as well as by unskilled lay persons such as patients, family members, and other care givers. The proposed device should be able to accommodate a variety of sharps or similarly small biologically contaminated items that would be ill disposed of in an ordinary trash can.

Numerous attempts have been made in the prior art to design a safe disposal container for hypodermic syringes and needles. However, such devices do not allow for both the removal and attachment of hypodermic syringes and needles in a safe manner. Such devices also do not teach their sterilization to enable them to be used in any capacity other

than their capacity for disposal. All of the prior devices for holding and facilitating safe disposal of the needles will destroy the sterility of the sterile field. Any health care worker walking about with an open container full of contaminated needles should not be allowed anywhere near a sterile field. Many of the devices are not only too contaminated, they are too large for the sterile field. Most of the prior devices which will accommodate large numbers of syringe needles, by being contaminated, require the health care workers to carry the needles to it, again exacerbating the handling problem and increasing danger to others from open carriage of the contaminated material. In prior devices, no attempt is made to either start with a sterile space nor to isolate stored needles from other needles which have been contaminated by other patients.

For example, U.S. Patent No. 5,046,612 issued to Mostarda et al. and U.S. Patent No. 4,917,243 issued to Abrams both provide hand held receptacles that extract hypodermic needles from hypodermic syringes. As such the used hypodermic needles are longitudinally placed inside the receptacle and removed from the hypodermic syringe to thereby reduce the risk of injury from the hypodermic needle tip. Both inventions provide different means for inserting the hypodermic needle into the receptacle longitudinally such that the risk of exposure to the sharpened hypodermic needle tip is reduced. However, there are

no methods for reusing the hypodermic needle as is necessary when re-filling a hypodermic syringe with fluid or medication or re anesthetizing a patient, or re-injection of a joint.

In U.S. Patent No. 5,057,656 issued to Galber, a disposal
5 container for hypodermic needles is provided. The container includes a top with suitably shaped openings for the removal of hypodermic needles from hypodermic syringes. Used hypodermic needles are disposed inside the container to protect the health care worker. Also, the needles inserted into the
10 foam filled container can't be reversed and used again as foam fills the needle opening.

Furthermore, in U.S. Patent No. 4,375,849 issued to Nahifl
and U.S. Patent No. 4,351,434 issued to Elisha, hypodermic
needles are disposed in a cylindrical container through an
opening in the container top. However, such containers pose a
risk of injury to the health care worker because the container
is usually held with a hand that can be punctured by the
exposed hypodermic needle tip as it is inserted into the
20 container. As such, these containers do not provide a safe method of disposal. Similarly, U.S. Patent No. 4,995,871 issued to Sasaki et al. And U.S. Patent No. 4,984,686 issued to Shillington provide enclosure lids that extract the hypodermic needle from the hypodermic syringe and then dispose of the
25 hypodermic needle in an attached container. However, both

devices are complex and not easily manufactured and do not provide for the safe storage of exposed hypodermic needle tips.

Additionally, U.S. Patent No. 4,892,191 issued to Nakamura, discloses a container for the removal and disposal of press or slip type hypodermic needles attached to a hypodermic syringe while U.S. Patent No. 4,802,579 issued to Hall et al. discloses a container which removes and disposes of hypodermic needles that use screw threads to attach the hypodermic syringe. In both devices, the hypodermic needle is inserted into the disposal container through an opening and engaged thereby. The opening is then used to remove the hypodermic needle from the hypodermic syringe and the exposed hypodermic needle is dropped down into the container. However, neither of these devices provide means for storing the exposed hypodermic needles while being attached or removed from the hypodermic syringe before being disposed.

Furthermore, U.S. Patent No. 4,191,264 issued to Shinall discloses a removal and disposal device for hypodermic needles. The device comprises individual containers that remove and store the used hypodermic needle in a tacky substance. As such, the device is complicated and expensive to manufacture and does not allow needle re-use. Similarly, U.S. Patent No. 4,452,358 discloses a box-like device wherein the hypodermic needle is destroyed while being removed from the hypodermic syringe and the container includes multiple compartments and openings for

the disposal of other medical instruments such as scalpel blades.

As can be seen from the related prior art, numerous devices have been designed for the disposal of hypodermic syringes and needles. However, none of the prior art devices provide an apparatus that can safely remove, attach and store the hypodermic needle and then properly dispose of the hypodermic needle after use.

What is therefore needed is an inexpensive device that protects the health care worker from inadvertent needle sticks while handling hypodermic needles and syringes. The needed device and method should be simple to use and therefore optimal for use by both trained professional health care workers as well as unskilled lay persons who may have need of using hypodermic syringes and needles in a home care setting. Additionally, there exists a need for provision of both storage of hypodermic needles, with or without a hypodermic syringe attached, and for disposal of hypodermic needles quickly and safely after their use and subsequent detachment from hypodermic syringes. Furthermore, there is a need for containment and disposal of other sharp objects such as suture needles, or other small items that may be biologically contaminated and that would be more appropriately disposed of in a biological waste container rather than in a trash can.

Summary of the Invention

The needle holder of the present invention has a variety of features that make it an optimal device for safe storage and disposal of hypodermic needles. Further, the needle holder of the present invention is also able to accommodate surgical needles or other small sharps or biologically contaminated articles, and may be easily and conveniently employed in a variety of settings. Alternative embodiments of the present invention will accommodate double-ended hypodermic needles, and larger versions of hypodermic needles such as thoracic, cardiac, or spinal needles.

In the preferred embodiment of the present invention, there is provided a hypodermic needle holder which works with a hypodermic needle having a needle hub adjacent a needle shaft and terminating at a needle tip. The hypodermic needle holder comprises a body portion and a lid portion, the body portion of which defines a compartment having a plurality of needle retainers disposed in a side-by-side relation therein. The needle retainers are sized and configured to frictionally engage the needle hub of a hypodermic needle in a manner wherein the hypodermic needle is fixedly contained within the needle retainer. The needle retainers are frustoconical or conically or of tapering shape and also specially internally shaped for frictional retention of the hypodermic needles. The compartment has a generally rectangular configuration and is

optimally formed from a rigid and durable plastic material. The lid portion of the hypodermic needle holder is moveable between an open position where the needle retainers are accessible and a closed position whereat the needle retainers are shielded within the hypodermic needle holder.

The hypodermic needle holder of the present invention also includes a receptacle into which smaller sized needles such as surgical needles may be placed after use. Furthermore, this receptacle may be used for small items such as cotton balls, gauze pads, or discontinued intravenous catheters that may be biologically contaminated and that would be best disposed of in a bio-hazardous waste container. The material from which the needle holder may be constructed may be clear in order to facilitate a visual count of suture needles as well as a count of engaged and stored hypodermic needles.

In an alternative embodiment of the present invention, the size of the overall hypodermic needle holder and of the needle retainers themselves are elongated in order to contain longer hypodermic needles such as cardiac, thoracic, or spinal needles.

In yet another alternative embodiment of the present invention, a container is provided with a slightly larger opening in order to accommodate a double ended hypodermic needle such as those used in many dental practices, as well as those used in the medical profession primarily by phlebotomists

and in conjunction with devices such as VACUTAINERS.

Further there is provided a method for transferring attachment of a hypodermic needle to or from a hypodermic syringe through the use of a hypodermic needle holder which includes an opening with at least one engaging needle retainer disposed therein. The method includes frictionally engaging the hypodermic needle to the needle retainer both by insertion friction and turning friction. The hypodermic syringe is advanced into the opening of a hypodermic needle holder and subsequently into a needle retainer space and retainer structure for initial axial frictional engagement to cause the hypodermic needle to be frictionally engaged with the retainer structure. The hypodermic syringe can be disengaged from the hypodermic needle by a turning motion against the friction and locking holding power of the needle retainer, to disengage the needle from its LUER fitting. The hypodermic syringe can be re-engaged onto the hypodermic needle by approach of the syringe, and physical engagement of the LUER fitting by a turning motion against the friction and locking holding power of the needle retainer, to re-engage the LUER fitting. Once re-engaged, a simple axial pulling of the syringe and LUER attached needle will disengage the hypodermic needle from the needle retainer. If needed, the hypodermic needle and syringe combination can be disengaged from the needle retainer and removed from the opening of the hypodermic needle holder for

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further use. By providing a relatively larger structure than a simple cap, movement of the hypodermic needle into and from its storage area is accomplished while the fingers and hand not holding the hypodermic syringe can support the hypodermic needle holder significantly far from the area of entrance of the needle into the hypodermic needle holder. Furthermore, the hypodermic needle holder includes an openable and closable lid portion for selectively accessing the needle retainer wherein the lid portion must be opened prior to advancing the hypodermic syringe into the opening of the hypodermic needle holder.

The present invention further includes a method of removing a hypodermic needle from a hypodermic syringe that includes a hypodermic needle holder having an opening with at least one needle retainer disposed therein. The method comprises advancing a hypodermic syringe with a hypodermic needle coupled thereto into the hypodermic needle holder and subsequently into the needle retainer. Next, the hypodermic needle is frictionally engaged to the needle retainer. The hypodermic syringe is then uncoupled from the hypodermic needle, leaving the hypodermic needle engaged within the needle retainer. The hypodermic syringe and needle may be coupled via a frictional engagement wherein uncoupling the hypodermic syringe from the hypodermic needle comprises pulling the hypodermic syringe away from the hypodermic needle.

Alternatively, the hypodermic syringe and needle may be coupled via a LUER fitting such that uncoupling the hypodermic syringe from the hypodermic needle comprises rotation of the hypodermic syringe to disengage the hypodermic needle. Furthermore, the hypodermic needle holder includes a lid portion such that the lid portion must be opened prior to the advancement of the hypodermic syringe into the hypodermic needle holder.

Brief Description of the Drawings

The invention, its configuration, construction, and operation will be best further described in the following detailed description, taken in conjunction with the accompanying drawings in which:

Figure 1 is a view of the hypodermic needle holder of the present invention, and illustrates a body portion that defines a compartment having a receptacle at one side and a plurality of needle retainers adjacent the end receptacle, and a lid portion in an open position and with a cantilevered latch connected to the body portion and ;

Figure 2 is a perspective expanded view of a hypodermic needle and illustrates a hub adjacent a needle shaft with a beveled edge that terminates at a needle tip.

Figure 3 is a view of more of the needle support structure of the hypodermic needle holder of Figure 1 from an elevated perspective and illustrates the overall shape and position of

the receptacle and the plurality of needle retainers, and the attachment of the lid portion in an open position with cantilevered latch;

Figure 4 is a view of the bottom of the hypodermic needle holder of Figures 1 and 3 and illustrates the body portion, the extent of the structural support as an "H" overall shape, the position of the receptacle and needle retainers, and the lid portion in an open position;

Figure 5 is a side view of the hypodermic needle holder of Figures 1, 3, and 4 that best illustrates the overall shape and side-by-side orientation of the receptacle and plurality of needle retainers, and clearly illustrates the cantilevered latch extending from the lid;

Figure 6 is a view of the top of the hypodermic needle holder of Figures 1, 3, 4, and 5 and illustrates the body portion, the position of the receptacle and needle retainers, and the lid portion in an open position with single body hinge and cantilevered latch;

Figure 7 is an expanded view along line 7 of Figure 6 that illustrates in more detail the configuration of each of the plurality of needle retainers;

Figure 8 is a cross-sectional view along line 8-8 of Figure 6 and more clearly illustrates the body of the hypodermic needle holder and the position of the receptacle and plurality of needle retainers therein;

Figure 9 is a cross-sectional view along line 9-9 of Figure 5 and more clearly illustrates one of the plurality of needle retainers and its position relative to the body portion, lid portion, and cantilevered latch thereon the lid portion;

5 Figure 10 is an expanded view along line 10 of Figure 9 that illustrates in detail a catch on the cantilevered latch on the lid portion of the hypodermic needle holder;

10 Figure 11 is a cross-sectional view along line 11-11 of Figure 5 that more closely illustrates the overall shape of the receptacle and its position relative to the lid portion of the hypodermic needle holder;

Figure 12 is an expanded view along line 12 of Figure 11 that illustrates a bifurcation in the lid portion to allow for movement of the lid portion;

5 Figure 13 is a top view of a second embodiment of the hypodermic needle holder configured to accommodate a pair of double-ended needles such as dental needles or needles used for phlebotomy;

20 Figure 14 is a side view of the second embodiment of the needle holder with an elongated needle accommodation portion utilizable for longer needles, such as cardiac needles, and further illustrating a double-ended needle for illustration purposes;

25 Figure 15 is a view taken along section 15 - 15 of Figure 7 and illustrating a frontal view of one of side of the four

square openings from the top of one of its four flat inner walls and proceeding downwardly into the needle accommodation chamber and particularly illustrating a slanted bib surface whcih transitions into an inwardly curved surface and which
5 finally transitions to a generally straight angled frusto-conical surface;

Figure 16 is a side view as seen in Figure 15 and illustrating the lateral extent of the associated surfaces seen at the same level as seen in Figure 15;

10 Figure 17 is a perspective view of a further embodiment of the hypodermic needle holder having a positive lock lid which is tamper resistant, and having outwardly and downwardly extending projections to independently stabilize the holder; and

15 Figure 18 is a side view and illustrating further details of the embodiment of Figure 17 and including a peel strip for attaching the holder to another surface.

Detailed Description of the Preferred Embodiment

20 The description and operation of the hypodermic needle holder of the invention will be best described with reference to Figure 1. The hypodermic needle holder 11 includes a body portion 13 having an upper wall 14 that defines an opening 15. Note that while the overall shape of the opening 15 of the
25 hypodermic needle holder 11 in the preferred embodiment is

elongate oval, a variety of shapes is possible without
compromise of functionality, such as rectangular, rectangular
with curved edges, and the like. The opening 15 is enclosable
by a lid portion 21 adjacent the opening 15 of the body portion
13. The lid portion 21 has a cantilever operated latch 23
adjacent a rectangular opening 24 and attached from the lid
portion 21. Cantilever operated latch 23 terminates in a right
angled extension to form a catch 25. The body portion 13,
attached to the lid portion 21 further defines a planar portion
31, within the space beyond the opening 15, having a single
circular opening 33 and a series of generally square openings
35, each of the series of square openings 35 are in turn
surrounded by a plurality of tapered blind bores 37, separated
by a series of four rectangularly placed planar members 39.
Each of the series of square openings 35 is arranged in a side-
by-side configuration with each of the others in the series of
square openings 35, and with respect to the single circular
opening 33. This arrangement is not exhaustive of the spatial
arrangements possible, but in the preferred embodiment of the
hypodermic needle holder 11 it does have a low profile in one
dimension to facilitate disposal in a sharps container having a
narrow opening. The single circular opening 33 in the planar
portion 31 leads into a frustoconical shaped receptacle 43
defined by the body portion 13 of the hypodermic needle holder
11 for containment and eventual disposal of small sharps such

as surgical needles, or small biologically contaminated items such as cotton balls, gauze squares, or even discontinued intravenous catheters.

Each of the series of square openings 35 leads into a corresponding one of a plurality of needle retainers 45 defined by the body portion 13 of the hypodermic needle holder 11. The frustoconically shaped receptacle 43 and plurality of needle retainers 45 are arranged such that their longitudinal axes are parallel with one another in order to save space. The axes of the frustoconical receptacle 43 and plurality of needle retainers 45 are arranged generally parallel with the general longitudinal extent of the holder 11. The axes of the frustoconical receptacle 43, and plurality of needle retainers 45 are perpendicular to the planar portion 31.

The hypodermic needle holder 11 may be optimally constructed from a durable but slightly flexible material such as injection molded plastic, that will allow some radially outwardly displacement of each planar member 39 forming each wall of the square of the series of square openings 35 and into the area of each of the plurality of blind bores 37. Any radially outward displacement as a result of inserting a needle (illustrated in Figure 2) provides an inward grip, in addition to the spatial engagement of the square shape of the planar members on the square aspects of a needle. Construction of the hypodermic needle holder 11 from such a slightly flexible

material will thus result in a displacement based inward biasing of the material toward the hub of the needle (illustrated in Figure 2) for enhancing the frictional engagement and trapping of the needle within the hypodermic needle holder 11. The body portion 13 of the hypodermic needle holder 11 also defines four tapered flanges 47 extending away from the end of the holder 11 adjacent the opening 15, and arranged such that each of two pairs of tapered flanges 47 is disposed at opposite lateral sides of the hypodermic needle holder 11, with one of each pair oppositely disposed from the other of each pair. The tapered flanges 47 help to stabilize the hypodermic needle holder 11 during upright placement on a planar surface such as a table, as well as provide overall structural strength and integrity.

Figure 2 is a view of a hypodermic needle 51 having a needle hub 53 with opening 55 surrounded by a square flange member 56 to complete a LUER fitting. Between the hub 53 and a needle shaft 57, is a series of four projecting ribs 59 which give the lower part of the hub 53 a square profile to provide a rotational lock with respect to the planar members 39 forming each wall of the square of the series of square openings 35. Each of the projecting ribs 59 will fit at a corner of the junction of each of the planar members 39 to provide a square rotational lock, in addition to the frictional engagement from axial insertion of the hypodermic needle. Needle shaft 57 has

a beveled edge 61 that terminates at a needle tip 63.

Figure 3 is a perspective view of the reverse side of the hypodermic needle holder 11, with respect to the perspective view of Figure 1 from an elevated perspective and further illustrates the lid portion 21 as having one or more bifurcations 71 adjacent the body portion 13 and extending across the full width of the lid portion 21 at its connection to the body portion 13. The bifurcation 71 may preferably be a thinning of the material in order to direct and control the lid portion 21 to close in a mating relationship over the opening 15. Further, the bifurcation or bifurcations 71 allow a user to manually and orderly open the lid portion 21 in order to gain access to the needle retainers 45 or frustoconical receptacle 43, or to close the lid portion 21 in order to enclose the contents of the frustoconical receptacle 43 and the plurality of needle retainers 45 for safety or for containment of biologically contaminated items.

—Ideally, the hypodermic needle holder 11 of the present invention would be constructed of a durable, yet somewhat flexible material such as plastic, to allow for movement of the lid portion 21 without breakage at the bifurcation 71. One material of construction is polypropylene. The bifurcation 71 has sometimes been known as a living hinge, and can be formed by controlling the thickness and width of its extent.

The body portion 13 of the hypodermic needle holder 11

defines an interstitial planar web structure 73 extending between and radially perpendicular to each of the plurality of needle retainers 45 and frustoconical receptacle 43. The interstitial planar web structure 73 as a plane within which the axes of the plurality of needle retainers 45 and frustoconical receptacle 43 reside, thus enhancing the overall structural stability and particularly the upright stability of the hypodermic needle holder 11. Figure 3 further illustrates that each of the plurality of needle retainers 45 comprises a square opening 35 adjacent a chamber 74 having a tapering or frustoconical first portion 75 adjacent a conical or tapering second portion 77.

Figure 4 is a view of the bottom of the hypodermic needle holder 11 of Figures 1 and 3 and illustrates the lid portion 21 in an open position with attached cantilevered latch 23 and catch 25 (both illustrated in phantom) for securing the lid portion 21 in a closed position. Figure 4 also illustrates the body portion 13, the frustoconical receptacle 43 and the plurality of needle retainers 45, each in side-by-side orientation with one another. Also illustrated herein are the tapered flanges 47 defined by the body portion 13, and the bifurcation or bifurcations 71 in the lid portion 21 of the hypodermic needle holder that allows for and directs the movement of the lid portion 13 for opening or closing the lid portion 13. Figure 4 also illustrates the interstitial planar

web structure 73 and better details its position in the plane
formed by the longitudinal axes of the frustoconical receptacle
43 and plurality of needle retainers 45. Figure 4 illustrates
in phantom format the opening 15 defined by the body portion
13.

Figure 5 is a side view of the hypodermic needle holder of
Figures 1, 3, and 4. Figure 5 illustrates the frustoconical
receptacle 43 in side-by-side alignment with the plurality of
needle retainers 45, and also clearly illustrates the
frustoconical first portion 75 adjacent the tapering second
portion 77 of each of the chambers 74. Also illustrated in
phantom in Figure 5 is the opening 15 defined by the wall 14 of
the body portion 13 of the hypodermic needle holder 11. The
lid portion 21 is illustrated in an open position out of the
plane of the page, with cantilevered latch 23 shown and catch
25 illustrated in phantom. The interstitial planar web
structure 73 as well as the two of the four tapered flanges 47
is also clearly seen in Figure 5.

Figure 6 is a view of the top of the hypodermic needle
holder 11 of Figures 1, 3, 4, and 5 and illustrates the lid
portion 21 in an open position and with attached cantilevered
latch 23 and catch 25 for securing the lid portion 21 in a
closed position. Figure 6 illustrates the body portion 13, the
opening 15 defined by the body portion 13, the planar portion
31, the single circular opening 33 adjacent the frustoconical

receptacle 43, and the series of square openings 35, each surrounded by plurality of blind bores 37, separated from the square openings 35 by series of four rectangularly placed planar members 39 and each of which is adjacent one of the plurality of needle retainers 45. Two of the tapered flanges 47 defined by the body portion 13 are also be seen in Figure 6. Finally, Figure 6 illustrates in phantom the bifurcation 71 in the lid portion 21 of the hypodermic needle holder 11 that allows for movement of the lid portion 13. The birfucation 71 could have been placed on either side of the lid portion 13, or a pair of oppositely located shallow bifurcations could have been placed on opposite sides of the lid portion 13, and the phantom showing is for consistency only. The main idea is some structure which guides folding.

Figure 7 is an expanded view along line 7 of Figure 6 and further details the configuration of one of the plurality of needle retainers 45. Figure 7 illustrates a section of the planar portion 31 having one of the series of square openings 35 surrounded by plurality of blind bores 37 and separated by the series of four rectangularly placed planar members 39. Immediately inside the square opening 35, the needle retainer 45 has four flat inner walls 83 which are immediately adjacent each the series of four rectangularly placed planar members 39. Below the four flat inner walls, a beveled surface angled surface 85 sloping downward into a curve shaped wall 87. The

lateral extent of the angled surface 85 has a curved shape which permits the curved shaped wall 87 to lie adjacent the four flat inner walls 83 at the ends of the curved shaped wall adjacent the corners formed by the four flat inner walls 83.

5 The curve shaped wall 87 concentrates the contact area slightly for a more friction laden engagement with the needle hub 53.

The chamber 74 has a tapering shape leading to an abbreviated end 89. The angled surface 85 has an adjacent shape as an upwardly open parabolic shape. The beveled surface is a shape

10 consistent with the early extent of a diminishing tapered radius, and finally terminates on the frustoconical first portion 75 of inside of the chamber 74 of the needle retainer 45. Note that the bounds of the convexity of the curve shaped wall 87 define an inwardly curving shape. During use,

15 hypodermic needle 51 is inserted into the square opening 35 and is advanced toward the adjacent frustoconical first portion 75 and subsequent tapering second portion 77 of the chamber 45 so that the ribs 59 begin to place the hypodermic needle 51 in a position where it is limited in turning about its axis.

20 Continued insertion causes the needle hub 53 to contact the curve shaped walls 87 within the frustoconical first portion 75 of the chamber 74. As the needle hub 53 advances into the square opening 35, the needle hub 53 will pass over the four flat inner walls 83, angled surface 85, and the curve shaped
25 wall 87. Once frictional engagement occurs, the four flat

inner walls 83 may be slightly outwardly displaced to provide more frictional grasping of the needle hub 53, especially at the middle, innermost aspect of the curve shaped walls 87 below the angled surface 85. While the hypodermic needle 51 is in place with respect to the holder 11, a syringe to which it is attached can be twisted to de-couple the LUER fitting to free the syringe, or the syringe can be brought again to the LUER fitting and twisted to re-couple the syringe to the hypodermic needle 51. Withdrawal of the hypodermic needle 51 from the hypodermic needle holder 11 can then accomplished by a frictional extraction of the hypodermic needle 51 from the needle holder 11.

Figure 8 is a cross-sectional view of the hypodermic needle holder 11 taken along line 8-8 of Figure 6 that illustrates the body portion 13, the opening 15 defined by the body portion 13, the cantilevered latch 23 with catch 25, the frustoconical receptacle 43, and the plurality of needle retainers 45. The series of interstitial planar web structure 73 are illustrated as shaded in this figure.

Figure 9 is a cross-sectional view taken along line 9-9 of Figure 5 that more closely illustrates one of the plurality of needle retainers 45 of the hypodermic needle holder 11. Visible is the body portion 13, two of the tapered flanges 47, the frustoconical receptacle 43, the lid portion 21, the cantilevered latch 23 with catch 25, the bifurcation 71 in the

lid portion 21, the opening 15 defined by the body portion 13,
and the square opening 35, frustoconical first portion, and
conical second portion of the chamber 74. A flat underside
surface 91 lies adjacent and just adjacent wall 14. Flat
underside surface 91 forms a right angle with respect to the
outside of wall 14.

Figure 10 is an expanded view along line 10-10 of Figure 9
that illustrates in close detail the catch 25 of the
cantilevered latch 23 of the hypodermic needle holder 11
extending at a right angle to one side and having a flat
portion 93 which will contact and complementarily fit the flat
underside surface 91 to enable the lid portion 21 to be locked
over the opening 15 to form an enclosure from which any
hypodermic needles 51 cannot escape. Typically, the lid
portion 21 will be closed and locked at one time, usually just
before disposal.

Figure 11 is a cross-sectional view taken along line 11-11
of Figure 5 that more closely illustrates the frustoconical
receptacle 43 and single circular opening 33 of the hypodermic
needle holder 11. In Figure 11, the body portion 13, opening
15 defined thereby, lid portion 21, and bifurcation 71 therein
may easily be seen.

Figure 12 is an expanded view along line 12-12 of Figure
11 that more closely details the bifurcation 71 of the lid
portion 21. As has been observed, the bifurcation in this

case is a thinning of the material and such thinning can occur on either or both sides of the lid portion. Multiple thinned areas can be used in order to control the bending of the material to form a hinge.

5 Figure 13 is a top view of a second embodiment of the hypodermic needle holder as a holder 101 configured to accommodate a pair of double-ended needles such as dental needles or needles used in conjunction with VACUTAINERS for phlebotomy. In this embodiment of the hypodermic needle holder
10 101, the diameters of the series of square openings 35 of the needle retainers 45 are sized larger to accommodate a larger needle hub (illustrated in Figure 14). This embodiment of the hypodermic needle holder 11 may be utilized anywhere, but may be best suited for health care facilities such as dentist's offices, laboratories, mobile blood banks, and other locations where use of a double-ended hypodermic needle is common.

20 A further embodiment of the hypodermic needle holder is seen as holder 111 and is seen in Figure 14. The overall size of the hypodermic needle holder 111 for cardiac and other elongate needles is itself longer. Cantilevered latch 23 and catch 25, the body portion 13, the opening 15 defined thereby, and two of the tapered flanges 47 may also be seen in this figure. Finally, the lid portion 21 is illustrated in phantom in Figure 14.

25 Figure 14 further illustrates, as an example, a double-

ended hypodermic needle 113. Double ended hypodermic needle 91 has a first needle shaft 115 terminating in a first needle tip 117 at one end and adjacent a needle hub 119 at an opposite end. The needle hub is adjacent one end of a second needle shaft 121 that is typically longer in length than the first needle shaft 115 and that terminates in a second needle tip 123 at an opposite end. Figure 14 best illustrates the heightened size of the second embodiment of the hypodermic needle holder 11 to provide for accommodation of a double-ended needle 91 such as the one illustrated herein. In Figure 14, the proper position of double-ended needle 113 for insertion into the hypodermic needle holder 111 is shown. Note that the hypodermic needle holder 11 may be also be manufactured sized to fit any length of hypodermic needle such as thoracic, cardiac, or spinal needles. The double-ended needle 113 is shown attached to a syringe 131 and is especially preferable to use the syringe 131 for insertion of doubled-ended needles for safety.

The hypodermic needle holder 11 has an unusual shape within its series of square openings 35. The shape is intended to simultaneously (1) provide easy entry with minimum restriction, (2) provide a square engagement, and upon further insertion (3) provide a frictional hold by concentrating force on a relatively limited amount of common structure/material in order to obtain a frictional hold on the hypodermic needle 51.

Figure 15 is a view taken along section 15 - 15 of Figure 7 and illustrating a frontal view of one of side of the four square openings 35 from the top of one of the four rectangularly placed planar members 39. The view taken along section 15 - 15 is unlike the views taken generally oriented to the hypodermic needle holder 11 since directional normal to the general extent of the holder 11 portray the square openings 35 as diamond shape. It is understood that the openings may be oriented differently, such as where each one of the four rectangularly placed planar members 39 are generally parallel to the outer extent of the holder 11.

Referring again to Figure 15, recall that behind the rectangularly placed planar members 39 are the plurality of wedge shaped blind bores 37 and it is shown in Figure 15 in dashed line format. The wedge shape of the plurality of blind bores 37 insures that the injection mold can withdraw in a direction normal to the planar portion 31 and out of the paper, toward the observer with respect to Figure 6, but the existence of the plurality of blind bores 37 insures that each of the four rectangularly placed planar members 39 can ultimately flex to form a final friction or grabbing action at the extreme mouth of the series of square openings 35.

The shaped area within the series of square openings 35 should also ideally be ultimately tapered toward the abbreviated end 89 of the openings, else a more complicated

mold with moving parts would be necessary to form such an internal shape existing between each square opening 35 and the abbreviated end 89.

Figure 15 illustrates a "square on" view of one of the four rectangularly placed planar members 39. The illustration of the blind bore 37 in dashed line format to the rear emphasizes the wall-like characteristics of the structure in that having a space behind and in front admits to the possibility of some flexing. From the top of the rectangularly placed planar members 39, a short length of flat wall 141 is seen. From the short length flat wall 141, an angled transition 143 to the angled surface 85 is seen. The angled surface 85 extends outward, in the direction of the observer, along its length in a direction from the angled transition 143. The angled surface 85 extends forward at its maximum extent at the bottom of a "bib" shape. Below the angled surface 85 is the curve shaped wall 87. The curve shaped wall 87 extends outwardly from corners 145 somewhat cylindrically in the direction of the observer of Figure 15. Note that the corners 145 extend to the top level of the angled surface 85 and the surfaces of the curved shaped wall are curved even near their uppermost extent where interrupted by the angled surface 85. Along the length of the curve shaped wall 87, it tapers in the direction of the observer of Figure 15. Below the curve shaped wall 87, an inner wall 147 of the conical second portion 77 is

seen, and which marks a transition to an inwardly curved wall shape.

Referring to Figure 16, a view taken with regard to line 16 - 16 shows the side profile of the surfaces seen in Figure 15 and illustrating the lateral extent of the associated surfaces seen at the same level as seen in Figure 15. One of the corners 145 is seen in dashed line format. As can be seen, angled surface 85 assists in guiding a needle tip 63 of the hypodermic needle 51, while the curve shaped wall 87 forms a line of concentration of frictional forces on any rounded object, such as needle hub 53, along its center between the angled surface 85 and the inner wall 147. The square nature of the flat wall 141 and the angled surface 85 help engage the square nature of the hub 53 of the hypodermic needle 53. As such, a transition from square facilitated entry for square turning engagement transitions into a concentrated contact and friction surface interaction with the curve shaped wall 87. This combination of structures thus facilitates entry, rotational lock and axial frictional engagement.

Referring to Figure 17, a variation of the hypodermic needle holder of the invention is seen as a hypodermic needle holder 151 which has many of the same structures seen for holder 11, including a lid portion 153. However, on lid portion 153, there is no latch 23 or catch 25. Rather the lid portion 153 is more closely contour matched to the shape of the

opening 15. Lid portion 153 includes a raised projection 155 about a position just inside of the outer periphery of the lid portion 153, positioned to enter the opening 15 when the lid portion 153 is closed over the opening 15. The raised
5 projection 155 may be made to form a more irreversible engagement and seal with respect to the opening 15 when the hypodermic needle holder 151 is closed. In the configuration shown, the outer surface of the raised projection may have a complementary shape matching the inner periphery of the opening
10 15 to form a snap shut seal. The snap shut mechanism, when combined with the matching peripheral shape, reduces the possibility that the hypodermic needle holder 151 will be inadvertently opened once it is closed.

As can be seen in Figure 17, a reduced thickness portion 157 is located at the center of a hinge 159 between the lid portion 153 and the opening 15, to more exactly define the fold of the hinge 159 and to place the raised projection 155 exactly within the opening 15 for a more automatic alignment. Once the raised projection 155 engages the complementary matching
20 surface 161 within the body portion 13 of the opening 15, a secure snap shut relationship will be had.

Figure 17 also illustrates a pair of hook arms 165 and 167 extending from the body portion 13, but also from near the upper end of the tapered flanges 47, and may be thought of as
25 an extension of the tapered flanges 47. This enables the hook

arms 165 and 167 to garner additional structural strength from the body of the hypodermic needle holder 151. Hook arms 165 and 167 are also advantageous for enabling the body portion 13 to be hung from the side, as from a tray or cart or box or container, essentially any object which has a vertical wall.

Where an object has a thick wall and is vertical, the body portion 13 is likely to hang more upright. On trays with thin walls and more inclined walls, the body portion 13 may hang at a more inclined angle. Any independent support which enables a practitioner to avoid having to support the body portion 13 by hand will significantly reduce incidence of needle stick.

Each of the hook arms 165 and 167 includes a lateral member 171 which extends generally parallel to the top of the body portion 13, and an opposing member 173 which extends opposite to the length of the tapered flange 47. The taper of the tapered flange 47 compared to the inside of the respective hook arm 165 and 167 causes the opening 15 to tilt somewhat away from any object from which it depends to make the opening 15 more easily available for manual manipulation of hypodermic syringes. The ability to utilize the hypodermic needle holder 151 by independently supporting it, further reduces the chances of a needle stick by removing the user's hand which is not engaging the syringe away from the vicinity of the hypodermic needle holder 151. It also frees the medical practitioner's other hand for other tasks, not to mention the fact that it

freed up tray or table area for other items. Further, the opposing members 173 could be forced through other material such as a box or other paper or cardboard structure to instantly obtain stability from other weaker objects. As can also be seen, the angle and spacing of the opposing members 173 represents an angular spread which can further assist in affixing the hypodermic needle holder 151 to deformable surface by enabling a progressive tearing action or a pinching action.

Referring to Figure 18, a further view of hypodermic needle holder 151 is seen. From the left, the side profile of the hook arm 167 is seen. Across the body portion 13, the thickness of the reduced thickness portion 157 is seen with respect to the center of hinge 159. A dashed arrow illustrates the radius of closure and is taken with respect to a pivot at the reduced thickness portion 157.

The side profile of the raised projection 155 is seen to have a laterally extending or laterally thickened projection 181 which is seen in profile as extending generally toward and away from the body portion 13. In practice, the laterally thickened projection 181 may extend completely about the raised projection 155, or only partially. A partial extension may, for example, only exist along the side of the raised projection 155 on one of the elongated linear lengths of the raised projection 155, or two. Or the partial extension may, for example, only exist along the curved sides of the raised

projection 155. Much may depend upon the strength of closure. In addition, the projection may be angled to provide one way, very irreversible closure. In any event, re-opening for purposes of unusual circumstance may still be had with the configuration shown by placing a prying tool into the crack between the body portion 13 and the lid portion 153.

At the bottom of the hypodermic needle holder 151, a tear away strip 185 covers a layer of adhesive 187. Adhesive layer 187 can be located elsewhere, as is shown in Figure 18, including on one side of the hypodermic needle holder 151 or the other and whether or not on the flanges 47.

Whether or not there is an available structure with which to engage one or more of the hook arms 165 and 167, the hypodermic needle holder 151 can be supported by adhesion to any suitable surface. Where the hypodermic needle holder 151 is made of a polymeric substance, the adhesive layer 187 will have high affinity for the bottom surface of the hypodermic needle holder 151 and provide a clean adhesive support for the hypodermic needle holder 151 on any stable surface. After use, and after closure, the hypodermic needle holder 151 can be manually and forceably tipped to one side to disengage it cleanly from any surface. Further, the hypodermic needle holder 151 may be supplied with an accompanying area of plastic base such as a credit card thickness of plastic to use as a further support, especially where there is no clean surface

immediately employable for such purpose. Such a support might have an area equivalent to the area of two or three wallet sized credit cards and may be pre-packaged with the hypodermic needle holder 151 as either a package add in or co-molded structure. Where such a base is utilized, the base can be removed and discarded after the hypodermic needle holder 151 use has terminated and after the lid portion 153 is closed over the opening 15.

The adhesive layer 187, and hook arms 165 and 167 are but two types of structures for additional support of the hypodermic needle holder 151, and other structures can be employed. Additional support assists medical practitioners by eliminating the chances and the necessity to bring the practitioner's hands together which has a higher likelihood where the hypodermic needle holder 151 is manually held. Even where manual holding is necessary, manual grasping can occur at the bottom end of the holder 151, away from the opening 15.

Although the invention has been derived with reference to particular illustrative embodiments thereof, many changes and modifications of the invention may become apparent to those skilled in the art without departing from the spirit and scope of the invention. Therefore, included within the patent warranted hereon are all such changes and modifications as may reasonably and properly be included within the scope of this contribution to the art.